IN THE CLAIMS

Please amend the claims as follows:

Claims 1-33 (Canceled).

Claim 34 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval[[,]];

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]]; and

using an optical measuring instrument to measure and calculate the acceleration of the other end surface,

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an acceleration output signal of the acceleration sensor, when two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained when two projectiles are launched separately, measured and calculated by the optical measuring instrument.

Claim 35 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch

tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval[[,]];

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when an elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]]; and

using [[a]] at least one strain gauge provided on a side surface of the metal rod to measure strain in the elastic wave pulse produced by the ~~projectile~~ impact[[,]] of the projectiles;

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an output signal of the acceleration sensor, when two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from strain gauge measurement signals obtained when two projectiles are launched separately.

Claim 36 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval[[,]];

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]]; and

measuring strain in the elastic wave pulse produced by the ~~projectile~~ impact of the projectiles ~~at a representative strain gauge location of~~ with a plurality of strain gauges affixed axially along a side surface of the metal rod;

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an output signal of the acceleration sensor, when two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from strain gauge measurement signals obtained when two projectiles are launched separately.

Claim 37 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval,

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

using [[a]] at least one strain gauge provided on a side surface of the metal rod to measure strain in the elastic wave pulse produced by the ~~projectile~~ impact[[,]] of the projectiles; and

calculating a correction to a strain gauge measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory,

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an output signal of the acceleration sensor, when two

projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from ~~correction~~ the calculated corrected signals obtained from the strain gauge when two projectiles are launched separately.

Claim 38 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval[[,]];

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

measuring strain in the elastic wave pulse produced by the ~~projectile~~ impact of the projectiles ~~at a representative strain gauge location of~~ with a plurality of strain gauges affixed axially along a side surface of the metal rod[[,]]; and

calculating a correction to a strain gauge measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory,

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an output signal of the acceleration sensor, when two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from ~~correction~~ the calculated corrected signals obtained from the strain gauge when two projectiles are launched separately.

Claim 39 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval[[,]];

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

using an optical measuring instrument to measure the acceleration of the other end surface[[,]];

using [[a]] at least one strain gauge provided on a side surface of the metal rod to measure strain in the elastic wave pulse produced by the projectile impact[[,]]; and

calculating a correction to a strain gauge measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory, using an output signal of the optical measuring instrument that measured the acceleration of the other end surface,

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an output signal of the acceleration sensor, when two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from ~~correction~~ calculated corrected signals obtained from the strain gauge when two projectiles are launched separately.

Claim 40 (Currently Amended): A method for measuring dynamic linearity of an acceleration sensor, comprising:

generating an elastic wave pulse in a metal rod by impacting one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently, and by impacting both projectiles simultaneously or at a prescribed time interval[[,]];

using an acceleration sensor provided on the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

using an optical measuring instrument to measure the acceleration of the other end surface[[,]];

measuring strain in the elastic wave pulse produced by the ~~projectile~~ impact of the projectiles ~~at a representative strain gauge location of~~ with a plurality of strain gauges affixed axially along a side surface of the metal rod[[,]]; and

calculating a correction to a strain gauge measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory, using an output signal of the optical measuring instrument that measured the acceleration of the other end surface,

wherein the dynamic linearity of the acceleration sensor is obtained by comparing in time domain and frequency domain an output signal of the acceleration sensor, when two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from ~~correction~~ the calculated corrected signals obtained from the strain gauge when two projectiles are launched separately.

Claim 41 (Currently Amended): [[A]] The method for measuring dynamic linearity of an acceleration sensor according to any one of claims 35, 37, and 39 [[to 40]], wherein the at least one strain gauge is composed of ~~a plurality of~~ at least two strain gauges provided on a

circumference of the metal rod at a same distance from the one end surface of the metal rod, and output signals from the ~~plurality of~~ at least two strain gauges are used in said measuring step.

Claim 42 (Currently Amended): [[A]] The method for measuring dynamic linearity of an acceleration sensor according to either one of claims 36 or 40, wherein each of a subset of the plurality of strain gauges are provided ~~at a plurality of locations in an axial direction that are provided in a plurality~~ on a circumference of the metal rod ~~at each location~~ at a same axial distance from the one end surface of the metal rod, and output signals from the plurality of strain gauges are used.

Claim 43 (Currently Amended): [[A]] The method for measuring dynamic linearity of an acceleration sensor according to any one of claims 34, 39, and 40, wherein the optical measuring instrument comprises a laser interferometer.

Claim 44 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of a metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in the metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

an optical measuring instrument ~~that measures~~ configured to measure a velocity of motion of the other end surface and calculates [[it as]] an acceleration[[,]] value from the measured velocity; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor when two projectiles are impacted simultaneously or at a prescribed time interval with the acceleration obtained when two projectiles are launched separately, measured, and calculated by the optical measuring instrument.

Claim 45 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of a metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in a metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

[[a]] at least one strain gauge provided on a side surface of the metal rod to measure strain in the elastic wave pulse[[,]]; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor, when the two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from strain gauge measurement signals obtained when the two projectiles are launched separately.

Claim 46 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of a metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in the metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

a plurality of strain ~~gauge provided at a plurality of locations~~ array including one or gauges affixed axially along a side surface of the metal rod that measures strain in the elastic wave pulse[[,]]; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor, when the two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from strain measurement signals produced by the acceleration at a representative strain gauge location.

Claim 47 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of the metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in the metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

[[a]] at least one strain gauge provided on a side surface of the metal rod to measure strain in the elastic wave pulse[[,]];

calculation means that calculates a correction to a strain gauge measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory[[,]]; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor, when the two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from correction calculated signals obtained from the strain gauge when the two projectiles are launched separately.

Claim 48 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of a metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in the metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

a plurality of strain ~~gauge provided at a plurality of locations~~ gauges affixed axially along a side surface of the metal rod that measures strain in the elastic wave pulse[[,]];

calculation means that obtains a representative location measurement signal from a strain gauge measurement signal and calculates a correction to the representative location measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory[[,]]; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor, when the two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from correction calculated signals based on strain gauge measurement signals obtained when the two projectiles are launched separately.

Claim 49 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of a metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in the metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

a plurality of strain ~~gauge provided at a plurality of locations~~ gauges affixed axially along a side surface of the metal rod for measuring strain in the elastic wave pulse[[,]];

an optical measuring instrument ~~that measures~~ configured to measure a velocity of motion of the other end surface[[,]];

calculation means that calculates a correction to a strain gauge measurement signal corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory, based on an output signal of the optical measuring instrument[[,]]; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor, when the two projectiles are impacted simultaneously or at a prescribed time interval, with a sum of acceleration signals obtained from correction calculated signals obtained from the strain gauge when the two projectiles are launched separately.

Claim 50 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 and 47 ~~to 49~~, wherein the at least one strain gauge ~~comprises a plurality~~ is composed of at least two strain gauges provided on a circumference of the metal rod at a same distance from the one end surface of the metal rod ~~to use~~, and output signals from the plurality of strain gauges are used to measure strain in the elastic pulse.

Claim 51 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to ~~claims~~ claim 49, wherein the calculation means calculates the correction to the strain gauge measurement signal, corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory, based on an output signal of the optical measuring instrument, with the acceleration sensor not attached to the metal rod.

Claim 52 (Currently Amended): An apparatus for measuring dynamic linearity of an acceleration sensor, comprising:

a launch apparatus ~~that impacts~~ configured to impact one of end surfaces of a metal rod with each of two round, concentrically located projectiles from a double launch tube independently and ~~impacts~~ impact both projectiles simultaneously or at a prescribed time interval to generate an elastic wave pulse in the metal rod[[,]];

an acceleration sensor affixed to the other of the end surfaces of the metal rod to measure an acceleration of the other end surface arising when the elastic wave pulse generated by the impact of the projectiles reflects at the other end surface[[,]];

a plurality of strain ~~gauge provided at a plurality of locations~~ gauges affixed axially along a side surface of the metal rod that measures strain in the elastic wave pulse[[,]];

an optical measuring instrument ~~that measures~~ configured to measure a velocity of motion of the other end surface[[,]];

calculation means that calculates a correction to a strain measurement signal produced by the acceleration at a representative strain gauge location corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory, based on an output signal of the optical measuring instrument[[,]]; and

comparison means that compares in time domain and frequency domain an output signal of the acceleration sensor with a correction calculated signal obtained from the strain gauge.

Claim 53 (Currently Amended): [[An]]The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims ~~45 to~~ 46, 48, 49 and 52, wherein each of a subset of the plurality of strain gauges ~~gauge comprises strain gauges provided in a plurality~~ are provided on a circumference of the metal rod ~~at each location~~ at a same axial distance from the one end surface of the metal rod.

Claim 54 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to either one of claims 49 or 52, wherein the optical measuring instrument comprises a laser interferometer.

Claim 55 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to claim 52, wherein the calculation means calculates a correction to an elastic wave pulse strain signal produced at a representative strain gauge location by the ~~projectile~~ impact of the projectiles, corresponding to wave dispersion and attenuation according to elastic wave pulse propagation theory, based on a signal of the optical measuring instrument, with the acceleration sensor attached to the metal rod.

Claim 56 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, wherein ~~the projectile has~~ both projectiles have a laminated structure of different materials.

Claim 57 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, wherein the ~~launch apparatus is a multiple~~ double launch tube ~~having~~ includes inner and outer launch tubes in which a frequency band of the elastic wave generated in the metal rod can be narrowed by launching multiple projectiles from the inner launch tube and controlling a phase of each projectile launch.

Claim 58 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, wherein in

accordance with a theoretical propagation of the elastic wave in the metal rod, when obtaining transient signal distortion of the elastic wave pulse incident on the other end surface from a strain gauge output signal, at least a primary term of a series-expanded Skalak's solution is used.

Claim 59 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, wherein in accordance with a theoretical propagation of the elastic wave in the metal rod, when obtaining transient signal distortion of the elastic wave pulse incident on the other end surface from a strain gauge output signal, up to a high-order term of a series-expanded Skalak's solution is used.

Claim 60 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, wherein the dynamic linearity of the acceleration sensor is measured by measuring the acceleration of the metal rod end surface and comparing in frequency domain an acceleration sensor input acceleration signal with an acceleration sensor output signal derived from acceleration measurement results, strain gauge measurements, or wave propagation theory.

Claim 61 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, further comprising:

a dynamic linearity calculation means that obtains a difference in timing at which the two projectiles impact the metal rod as a parameter in which a transient acceleration signal input to the acceleration sensor generated when a first projectile impacts the metal rod, and a

transient acceleration signal input to the acceleration sensor generated when a second projectile impacts the metal rod, best match a transient acceleration signal input to the acceleration sensor generated when both projectiles are launched simultaneously, and measures the dynamic linearity of the acceleration sensor from an acceleration sensor output signal obtained when each projectile is launched ~~independently and an acceleration sensor output signal obtained when both projectiles are launched~~ simultaneously or at a prescribed time differential.

Claim 62 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, further comprising:

a support means ~~that uses~~ for using point contact that does not hinder rigid motion in an axial direction for supporting the metal rod horizontally.

Claim 63 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, further comprising:

a metal ball contacted to the ~~metal rod~~ end surface [[and]] of the metal rod, wherein

the projectile launch apparatus launches a plurality of projectiles disposed in a concentric circle from the ~~multiple~~ double launch tube and precisely controls the launch timing with respect to the metal ball[[,]] to generate an elastic wave pulse in the metal rod.

Claim 64 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, ~~wherein a correction function~~ further comprising:

a set of essential replacement parts required to match individual acceleration sensors for correcting wave dispersion, wave attenuation, uncertainty of sound velocity value, acceleration sensor mass and gauge frequency response, and the metal rod to which a gauge is affixed~~, are constituted as a set of essential replacement parts required to match individual acceleration sensors~~.

Claim 65 (Currently Amended): [[A]] The method for measuring dynamic linearity of an acceleration sensor according to any one of claims 34 to 40, wherein ~~an inner projectile or outer projectile, or an inner group of projectiles launched from a multiple inner launch tube, or an outer group of projectiles launched from a multiple outer launch tube, does not depend on a launch sequence~~ the double launch tube further comprises:

an inner tube configured to launch a single inner projectile or a group of multiple inner projectiles;

an outer tube configured to launch a single outer projectile or a group of multiple outer projectiles,

wherein the launching of projectiles from the inner and outer tubes is independent of a launch sequence.

Claim 66 (Currently Amended): [[An]] The apparatus for measuring dynamic linearity of an acceleration sensor according to any one of claims 45 to 49 and 52, wherein ~~an inner projectile or outer projectile, or an inner group of projectiles launched from a multiple inner launch tube, or an outer group of projectiles launched from a multiple outer launch tube, does not depend on a launch sequence~~ the double launch tube further comprises:

an inner tube configured to launch a single inner projectile or a group of multiple inner projectiles;

an outer tube configured to launch a single outer projectile or a group of multiple outer projectiles,

wherein the launching of projectiles from the inner and outer tubes does is independent of a launch sequence.